



CONFIDENTIAL

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CERTIFICATE OF COMPLIANCE

The following product has been evaluated according to the 5th revised edition Amendment2 of the UN Manual of Tests and Criteria.

We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells and batteries and single cell batteries.

<input type="checkbox"/> Lithium-ion cell <input checked="" type="checkbox"/> Lithium-ion battery <input type="checkbox"/> Lithium-ion single cell battery	
Model name	L17L3P61
Cell Model name	P4043B0A1
Nominal voltage	11.58 V
Electric power capacity	36 Wh

Conducted By: Min Je Woo

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UN38.3 Test Report

- L17L3P61 (Nom.36Wh, 11.58V) -

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1. UN38.3 Test Condition

Test item	Test Condition	Requirements	Etc.
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> - After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) <ol style="list-style-type: none"> 1) If $M < 1g$, less than 0.5%, 2) If $1g \leq M \leq 75g$, less than 0.2%, 3) If $M > 75g$, less than 0.1% 	<p>T1~T5 : Sequence Tests</p> <pre> graph TD T1[Test 1 Altitude Simulation] --> T2[Test 2 Thermal Test] T2 --> T3[Test 3 Vibration] T3 --> T4[Test 4 Shock] T4 --> T5[Test 5 Ext. Short Circuit] </pre>
Test 2. Thermal Test	[72±2℃,6hr ↔ -40±2℃,6hr, interval max. 30min] x 10cycle Storing at 20±5℃ for 24h		
Test 3. Vibration	[7Hz↔200Hz↔7Hz, in 15min] x 12 times x 3 direction 1) sinusoidal waveform with a logarithmic sweep 2) 7Hz 18Hz (maintaining 1gn) app. 50Hz (until 8gn) 200Hz (maintaining 8gn), 1.6mm total excursion		
Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z), direction x 3 cycle		
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> - No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	for cylindrical cells (not less than 18mm diameter)
Test 6. Crush	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation		for cylindrical cells (less than 18mm diameter) for prismatic, pouch, coin/button cells
Test 7. Overcharge	Current = Manufacturer's recommended max. continuous charge current X 2 Voltage 1.If charge voltage ≤ 18V, V (min.) = 2 x (max. charge voltage) or 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Only for Single Cell Battery / Battery
Test 8. Forced Discharge	Discharge at max. discharge current (connecting in series with 12V DC power supply), Duration time = rated capacity/initial test current	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Resistance of Electric Loader 1/Ω = (max. discharge current) / (12 + Initial OCV)

2. General Information

1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2149 mA Voltage = 13.2 V	Current = 154 mA
Discharge	CC	Current = 614 mA	Voltage = 9.6 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 2149 mA Voltage = 13.2 V	Current = 154 mA
Discharge	CC	Current = 614 mA	Voltage = 9.6 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 2149 mA CC/CV 2Imax (4298mA) 22 V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 3070 mA Duration Time = 60 min

3-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
NO.	OCV	Mass (g)	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully charged state

1	13.171	152.10	13.163	152.09	99.94	0.005	Pass	12.981	152.07	98.62	0.016	Pass	12.976	151.99	99.96	0.050	Pass	12.945	151.99	99.76	0.000	Pass
2	13.172	152.05	13.168	152.04	99.97	0.007	Pass	12.999	152.01	98.72	0.018	Pass	12.968	152.01	99.76	0.003	Pass	12.966	152.01	99.98	0.001	Pass
3	13.174	152.04	13.168	152.04	99.95	0.000	Pass	13.038	152.01	99.01	0.017	Pass	12.973	151.98	99.50	0.022	Pass	12.956	151.98	99.87	0.001	Pass
4	13.189	152.06	13.180	152.06	99.93	0.002	Pass	12.978	152.06	98.47	0.003	Pass	12.974	152.04	99.97	0.013	Pass	12.967	151.91	99.95	0.083	Pass

B. 50th cycle fully charged state

5	13.174	152.05	13.169	152.05	99.96	0.001	Pass	12.988	152.04	98.63	0.009	Pass	12.966	151.99	99.83	0.032	Pass	12.961	151.98	99.96	0.005	Pass
6	13.174	152.10	13.164	152.10	99.92	0.000	Pass	12.989	152.07	98.67	0.016	Pass	12.974	152.05	99.88	0.012	Pass	12.961	152.02	99.90	0.024	Pass
7	13.173	152.08	13.169	152.07	99.97	0.002	Pass	12.986	152.01	98.61	0.042	Pass	12.976	151.97	99.92	0.024	Pass	12.973	151.95	99.98	0.013	Pass
8	13.179	152.05	13.172	152.04	99.95	0.002	Pass	12.982	152.02	98.56	0.017	Pass	12.971	151.97	99.92	0.032	Pass	12.959	151.96	99.91	0.003	Pass

3-2. T5/T7 Test Result

EXT.Short Circuit (T5)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

1	12.945	55.90	Pass
2	12.966	55.31	Pass
3	12.956	55.12	Pass
4	12.967	55.53	Pass

B. 50th cycle fully charged state

5	12.961	55.42	Pass
6	12.961	55.32	Pass
7	12.973	55.63	Pass
8	12.959	55.90	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

9	13.145	24.36	Pass
10	13.141	24.21	Pass
11	13.141	24.76	Pass
12	13.143	25.01	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully charged state

13	13.124	24.57	Pass
14	13.122	24.78	Pass
15	13.127	25.06	Pass
16	13.121	25.40	Pass

3-3. T6/T8 Test Result (P4043B0A1)

Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

C-1	3.862	22.51	Pass
C-2	3.862	22.38	Pass
C-3	3.862	22.68	Pass
C-4	3.863	22.67	Pass
C-5	3.861	22.44	Pass

Forced Discharge (T8)							
NO.	Initial OCV(V)	Max. Temp (°C)	Result	NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully discharged state

C-6	3.256	52.88	Pass
C-7	3.266	48.14	Pass
C-8	3.263	51.26	Pass
C-9	3.265	49.82	Pass
C-10	3.269	48.16	Pass
C-11	3.262	45.59	Pass
C-12	3.258	47.68	Pass
C-13	3.266	48.33	Pass
C-14	3.261	48.44	Pass
C-15	3.262	48.23	Pass

B. 50th cycle fully discharged state

C-16	3.263	41.60	Pass
C-17	3.261	42.02	Pass
C-18	3.264	42.49	Pass
C-19	3.268	41.59	Pass
C-20	3.267	40.32	Pass
C-21	3.269	40.19	Pass
C-22	3.267	41.92	Pass
C-23	3.269	41.30	Pass
C-24	3.267	40.31	Pass
C-25	3.262	41.53	Pass

4. Sample Image

